IN THE CLAIMS

Please cancel claim 52 without prejudice. Claims 53-80 are new.

The following claims are now pending in the present application:

1. (Previously presented) A method of writing a photo-induced structure into a photosensitive material substrate, the method comprising:

- creating an interference pattern utilising at least two light beams,

- exposing the substrate to the interference pattern for photo-inducing material changes in the substrate, and

- creating an irregularity in the interference pattern by controlling a wavefront of at least one of the beams, for creating a functional defect in the photo-induced structure.

2-52. (Cancelled)

53. (New) A method as claimed in claim 1, wherein the step of controlling the wavefront of at least one of the beams comprises utilising an adaptive optics device for altering the wavefront.

54. (New) A method as claimed in claim 53, wherein the adaptive optics device is a reflective or transmissive adaptive optics device.

55. (New) A method as claimed in claim 53, wherein the adaptive optics device comprises a micro electronic mechanical system (MEMS) device.

56. (New) A method as claimed in claim 55, wherein the MEMS device comprises an array of movable micro mirrors.

57. (New) A method as claimed in claim 53, wherein the adaptive optics device comprises a transmissive device based on at least one of a group of devices comprising liquid crystal devices, ferroelectric liquid crystal devices, and electrically controllable ferroelectric liquid crystal retarder plates.

58. (New) A method as claimed in claim 1, wherein the adaptive optics means for controlling the wavefront is further utilised to split an incoming light beam to create the at least two light beams for creation of the interference pattern.

59. (New) A method as claimed in claim 1, wherein the functional defect comprises a linear defect, whereby the resulting one-dimensional photo-induced structure exhibits a transmission resonance.

60. (New) A method as claimed in claim 1, wherein the method comprises creating a two-dimensional or three-dimensional interference pattern.

61. (New) A method as claimed in claim 60, wherein the functional defect comprises a two-dimensional or three-dimensional defect.

62. (New) A method as claimed in claim 61, wherein the two-dimensional or three-dimensional defect comprises an extended defect.

63. (New) A method as claimed in claim 1, wherein the functional defect comprises a dislocation defect, whereby the resulting photo-induced structure is asymmetric.

64. (New) A method as claimed in claim 1, wherein the method further comprises:

- inducing a relative movement between the substrate and an interference region of the beams,

- controlling a relative phase difference between the beams to induce changes in the interference pattern, and

- controlling a velocity of the changes in the interference pattern to write an extended photo-induced structure in the substrate.

65. (New) A method as claimed in claim 64, wherein the relative movement is effected through at least one of movement of the substrate and scanning of the beams.

66. (New) A method as claimed in claim 64, wherein the relative movement is effected through a combination of movement of the substrate and simultaneous scanning of the beams in a direction transverse to the movement of the substrate.

67. (New) A method as claimed in claim 64, wherein the method further comprises the step of further controlling the wavefront of at least one of the beams as a function of the relative movement, whereby at least one of the position, size, and shape of the functional defect along the resulting photo-induced extended structure is controlled.

68. (New) A method as claimed in claim 64, wherein the method further comprises controlling the wavefront of at least one of the beams to change the number of defects created along the photo-induced extended structure.

69. (New) A method as claimed in claim 64, wherein the method further comprises controlling the relative phase difference between the beams to vary at least one of a pitch of the interference pattern and a contrast of the interference pattern.

70. (New) A method as claimed in claim 69, wherein the contrast of the interference pattern is controlled to be zero for writing a photo-induced refractive structure.

71. (New) A method as claimed in claim 1, wherein the method further comprises shaping the beams to control the exposure of the substrate to the interference pattern.

72. (New) A method as claimed in claim 71, wherein the adaptive optics device is utilised in the shaping of the beams.

73. (New) A method as claimed in claim 1, wherein the method further comprises focusing the light beams in the interference region.

74. (New) A method as claimed in claim 1, wherein the method further comprises applying feedback corrections during the writing of the photo-induced structure, to achieve desired characteristics of the written photo-induced structure.

75. (New) A method as claimed in claim 1, wherein the photosensitive material substrate has a non-linear photosensitivity, and at least one of the beams is a pulsed laser beam, whereby a three-dimensional photo-induced structure can be written in the substrate utilising intensity variations in the created interference pattern.

76. (New) A method as claimed in claim 75, wherein the material change is selected from a group comprising refractive index change, change in solubility, change in density, change in light transmission/absorption, and change in susceptibility to the next technological process.

77. (New) A method as claimed in claim 1, wherein the method further comprises the step of controlling the polarisation of at least one of the light beams.

78. (New) A method as claimed in claim 69, wherein the adaptive optics device is utilised in the controlling of the relative phase difference.

79. (New) A photo-induced structure written into a photosensitive material substrate utilising the method of claim 1.

80. (New) An interferometer for writing a photo-induced structure into a photosensitive material substrate, the interferometer comprising:

- an interference unit arranged for creating an interference pattern utilising at least two light beams; and

- a control unit for controlling a wavefront of at least one of the beams to create an irregularity in the interference pattern for creating a functional defect in the photo-induced structure.